United States Department of the Interior

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M/021/030

March 27, 2003

Memorandum

To: Doug Jensen, DOGM

From: Ed Ginouves, BLM Cedar City Field Office

Subject: Bright Quarry LMO Application, M/021/030

Here is my first attempt to address the comments provided in your letter of February 28, 2002 on Neil Bradshaw's LMO application for the Bright Project. I realize it is awkward for me to be trying to finalize the permit application for Mr. Bradshaw, but I don't see any way we'll ever get to an approvable LMO without me acting as a go-between. I met with Mr. Bradshaw on March 21, to give him a copy of this and let him review it with the site operator, 3-H Landscaping of St. George. On March 27, Mr. Bradshaw told me the proposal was in line with their actual site plans. I told him I would work with the DOGM staff to resolve any problems or add narrative as needed. He said that would be OK. When we (BLM & DOGM) agree on an approvable LMO plan, I can get him to sign whatever is necessary to make it binding on him.

Give me a call or e-mail me on whatever needs changing/adjustment.

R647-4-105 - Maps, Drawings and Photographs

105.1 Additional Maps

Reclamation treatment will consist of regrading and ripping the processing pads followed by broadcast or drill seeding. The processing pads have been constructed using cut and fill within the existing soil profile and should contain all of the soil section but the upper ~6" of the soil profile and the vegetative matter.

Reclamation treatment of the quarry areas will consist of 1) partial backfilling with both waste rock and surplus/unmarketable processed fines (-¼" sand), 2) placement of screened fines on the pit floors, 3) replacement of salvaged topsoil on the screened fines, and 4) broadcast seeding. If the volume of the screened fines and/or salvaged topsoil are insufficient to create a suitable seed bed, these materials will be supplemented by removing material from the soil profile of the topsoil borrow area.

Reclamation treatment of the any new roads created by the project will consist of ripping the road bed and broadcast seeding.

Reclamation treatment of the borrow area, if utilized, will consist of ripping the area and drill seeding.

105.2 Drawings or Cross Sections

None. At present, pit depths are not expected to exceed 30' in depth.

R647-4-106 - Operations Plan

106.3 Estimated acreages disturbed and reclaimed annually

Present production rates are ~5,000 cyds of crushed stone per year. Assuming a net yield of 75% of marketable crushed stone from in-place rock, this corresponds to an annual production volume of ~6700 cyds. At the current quarry depths of 20'-30', this equates to 0.15-0.20 acres of additional quarry area per year. The current areas that have been cleared as processing and stockpiling areas are anticipated to be sufficiently large for continued operations at the current production rate.

The current permit boundary areas and currently disturbed areas as shown on ***Map #1***. The associated acreages are given in **Table 1**., below.

Table 1. Proposed Permit Areas and Current Disturbed Areas

Project Area	Permit Area (Acres)	Current Disturbance (Acres)
Northern Mine Area	2.3	1.0
Central Mine Area	2.0	0.0
Southern Mine Area	2.2	1.2
Northern Processing Area	3.6	3.0
Southern Processing Area	3.8	2.5
Topsoil Borrow Area	2.0	0.0
New Access Roads	0.4	0.3
Total	16.3	8.0

106.5 Existing soil types, location and amounts

Information on soil types, location, and amount was abstracted from Soil Survey of Iron-Washington Area, Utah, Parts of Iron, Kane, and Washington Counties, by Richard S. Jaros, National Resources Conservation Service, U.S. Dept. of Agriculture, 2001. According to that survey, the project disturbances fall within two mapped soil units, the Checkett-Rock outcrop complex (#347) and the Dixie gravelly loam (#370). Attached ***Map #1***, shows the current disturbance areas and the mine permit boundaries along with the mapped soil units. Detailed information on these two soil units, their typical pedons, characteristic plant communities, engineering, physical, and chemical properties were copied from the Soil Survey and provided as ***Attachment 1.***

Estimates of the areas of the soil units and the soil volumes within each of the identified project areas is given in **Table 2.**, below.

Table 2. Soil Units and Estimated Soil Volumes

Project Area	Soil Unit	Estimated Area (Acres)	Estimated Soil Depth (ft) (1)	Estimated In-Place Soil Volume (cyds)	Salvaged Soil Volume (cyds)
Northern Mine Area	Rock Outcrop Dixie	1.7 0.6	0.1 1.0	270 970	All (stockpiled)
Central Mine Area	Rock Outcrop	2.0	0.1	320	All (stockpiled)
Southern Mine Area	Rock Outcrop	2.2	0.1	350	All (stockpiled)
Northern Processing Area	Checkett Dixie	3.0 0.6	1.0 2.0	4,840 1,940	All (mostly left in place)
Southern Processing Area	Checkett	3.8	2.0	12,260	All (mostly left in place)
Topsoil Borrow Area	Dixie	2.0	3.0	9,680	N/A
New Access Roads	Checkett Dixie	0.2 0.2	0.1 1.0	30 320	All (left in place)
Total				29,070	

Footnotes

(1) Soil depths are estimates of soil depth based on current soil profile exposures on site.

106.5 Plan for protecting and depositing soils

Only the uppermost portion of the soil profile and contained vegetative matter (~6" in thickness) will be salvaged from the existing soil profile in the north and southern processing areas; the remainder of the soil profile will be utilized in cut and fill within this areas to create an gently sloping working area.

The small quantities of salvageable soil present in the mine (quarry) areas will be entirely stripped and separately stockpiled in advance of mining.

All salvaged soil material that is salvaged will be segregated and stockpiled.

106.6 Existing vegetation – species and amount

Information on existing vegetation species and amounts was abstracted from Soil Survey of Iron-Washington Area, Utah, Parts of Iron, Kane, and Washington Counties, by Richard S. Jaros, National Resources Conservation Service, U.S. Dept. of Agriculture, 2001, p. 311 & 317. **Table 3.**, below, provides characteristic vegetation types for the ecological sites to be disturbed by the project.

Table 3. Vegetation Species and Amounts

Soil Unit	Estimated Acres	Rangeland Site	Characteristic Vegetation	%
Checkett	7.0	Semidesert Shallow Loam (Wyoming Big Sagebrush)	Bluebunch wheatgrass Wyoming big sagebrush Other shrubs Other perennial grasses Indian ricegrass Other perennial forbes Nevada bluegrass Nevada Mormon tea	20 20 15 13 10 10 7 5
Rock Outcrop	5.9	Semidesert Shallow Loam (Wyoming Big Sagebrush)	(1)	(1)
Dixie	3.4	Semidesert Gravelly Loam (Wyoming Big Sagebrush)	Basin big sagebrush Indian ricegrass Galleta Other perennial forbes Winterfat Other shrubs Fourwing saltbrush Nevada Mormon tea Bluebunch wheatgrass Other perennial grasses	25 20 15 10 5 5 5 5 5 5
All Types	16.3			

Footnotes

(1) Those portions of the project disturbances that consist of the Rock outcrop soil unit appear to have similar vegetation types to those characteristic of the Checkett soil type, however they are present in lesser amounts.

R647-4-107 - Operation Practices

107.6 Concurrent Reclamation

It is proposed that the only concurrent reclamation for the first five years of operations will be the incremental backfilling of the mined-out pit areas using waste rock (quarried rock that is deemed unsuitable for crushing). The quantity of waste rock that will produced as a byproduct of normal quarrying operations is presently unknown. It is the goal of quarrying operations to keep this waste rock volume to a minimum but it is expected that it will amount to ~25% of the total rock volume quarried.

As the quarry operation matures and the quarry areas grow, it is proposed that unmarketable waste fines (¼" sand sized material) from the crushing and screening operation be placed in the mined out pit areas to dispose of the material and serve as a foundation for growth media replacement and vegetation.

R647-4-109 - Impact Assessment

109.4 Slope stability, erosion control, air quality, safety

A letter from the Air Quality Division has been requested and will be provided.

R647-4-110 - Reclamation Plan

110.2 Roads, highwalls, slopes, drainages, pits, etc., reclaimed

It is proposed that highwalls be reclaimed by the placement of waste rock (generated through normal quarry operations and/or unmarketable screened fines) against the highwall toe at a 2 to 1 angle.

110.5 Revegetation planting program

Seeding of all disturbed areas will be done between September 30 and December 15. Seed beds will be prepared to a depth of 6 inches by ripping, discing, or harrowing. Seed will be planted with a rangeland or farm drill or broadcast seeded. If broadcast seeded, the seed will be harrowed or raked ¼ to ½ inch into the soil. The seed amount described below will be doubled if the area is broadcast seeded. The recommended seed mixture and amounts to be used on all disturbed areas (if applied by a drill) includes:

Blue-bunch wheatgrass	2 lb / acre
Indian ricegrass (var. Nezpar)	1 lb / acre
Smooth brome grass	1 lb / acre
Pubescent wheatgrass	1 lb / acre
Small Burnet	1 lb / acre
Fourwing saltbush	½ lb / acre
Bitterbrush	½ lb / acre
Lewis Flax	½ lb / acre
Palmer Penstemon	½ lb / acre

R647-4-111 - Reclamation Practices

111.5 Land capable of post mining land use

Current land use consists of open grazing land and wildlife habitat. The value of the land for either use is primarily limited by the existing vegetation type and density.

It is anticipated that the post-mining topography and vegetative cover of the reclaimed *pit areas* will be less suitable for these existing land uses. It is anticipated that the post mining topography and vegetative cover in the reclaimed *processing pad areas* will be equally or more suitable for the existing land uses due to the potential to significantly improve upon the existing vegetation mix (increase grasses and decrease shrubs) in these areas from current vegetation present at the site. Overall, it is anticipated that

post-mining suitability of the land (for its current land uses) will not significantly change from its current suitability.

111.12 Topsoil redistribution

The majority of the soil section in the processing / stockpiling areas remains in place but has been re-distributed within the area to create a usable working pad. After all stockpiled processed products are removed from these areas, this soil will be re-graded to approximate the original slope in this areas.

The mined out quarry areas will be covered with salvaged topsoil from the quarry areas, supplemented by the upper portion of the soil profile from the topsoil borrow area.

R647-4-112 – Variance

No variances are requested.

R647-4-113 - Surety

The current reclamation surety of $21,500 posted with the BLM reflects and estimated cost of $2,500/acre to reclaim the mine areas (6.5 acres) and $1,000/acre to reclaim the remaining disturbances (9.8 acres).

Attachment 1 to LMO M/021/030, Bright Project
Soil Survey Data

Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches
Typical profile:
0 to 8 inches—Very cobbly loam
8 to 14 inches—Very cobbly sandy loam
14 to 19 inches—Cobbly sandy loam
19 inches—Igneous bedrock

Posant

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches
Typical profile:
0 to 4 inches—Very gravelly loam
4 to 10 inches—Very gravelly clay loam
10 to 18 inches—Very gravelly clay
18 inches—Igneous bedrock

Rock outcrop

Rock outcrop consists of exposures of bare bedrock.

Interpretive Groups

Land capability classification: Cathedral and Posant—7S nonirrigated; Rock outcrop—8 nonirrigated
Range site: Cathedral—Mountain Shallow Loam (Low Sagebrush); Posant—Mountain Shallow Loam (Curlleaf Mountainmahogany); Rock outcrop—no range site is assigned

346—Checkett gravelly loam, 5 to 40 percent slopes

Setting

Landform: Foothills and mountain slopes
Slope: 5 to 40 percent
Elevation: 5,300 to 6,000 feet
Mean annual temperature: 45 to 50 degrees
Mean annual precipitation: 8 to 12 inches
Frost-free period: 120 to 140 days

Composition

Major components

Checkett and similar soils: 85 percent

Minor components

Hiko Peak soils: 5 percent
Rock outcrop: 5 percent
Soils that are 20 to 40 inches deep over bedrock: 5 percent

Major Component Description

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches
Typical profile:
0 to 3 inches—Gravelly loam
3 to 9 inches—Very gravelly clay loam
9 to 16 inches—Very cobbly clay loam
16 inches—Igneous bedrock

Interpretive Groups

Land capability classification: 7S nonirrigated
Range site: Semidesert Shallow Loam (Black Sagebrush)

347—Checkett-Rock outcrop complex, 5 to 40 percent slopes

Setting

Landform: Checkett—foothills and mountain slopes; Rock outcrop—escarpments
Slope: 5 to 40 percent
Elevation: 5,200 to 6,000 feet
Mean annual temperature: 45 to 50 degrees
Mean annual precipitation: 10 to 12 inches
Frost-free period: 120 to 140 days

Composition

Major components

Checkett and similar soils: 60 percent
Rock outcrop: 25 percent

Minor components

Soils that are 20 to 40 inches deep over bedrock: 9 percent
Deerlodge soils: 6 percent

Major Components Description

Checkett

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches
Typical profile:
0 to 3 inches—Gravelly loam

3 to 6 inches—Gravelly clay loam
6 to 14 inches—Very gravelly clay loam
14 to 19 inches—Very cobbly clay loam
19 inches—Igneous bedrock

Rock outcrop

Rock outcrop consists of exposures of bare bedrock.

Interpretive Groups

Land capability classification: Checkett—7S nonirrigated; Rock outcrop—8 nonirrigated
Range site: Checkett—Semidesert Shallow Loam (Wyoming Big Sagebrush); Rock outcrop—no range site is assigned

348—Checkett-Rock outcrop complex, 8 to 25 percent slopes

Setting

Landform: Checkett—foothills and mountain slopes; Rock outcrop—escarpments
Slope: 8 to 25 percent
Elevation: 5,700 to 6,350 feet
Mean annual temperature: 45 to 50 degrees
Mean annual precipitation: 10 to 12 inches
Frost-free period: 100 to 120 days

Composition

Major components

Checkett and similar soils: 70 percent
Rock outcrop: 15 percent

Minor components

Radec soils: 9 percent
Pass Canyon soils: 6 percent

Major Components Description

Checkett

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches
Typical profile:
0 to 4 inches—Gravelly loam
4 to 7 inches—Very gravelly loam
7 to 10 inches—Very gravelly clay loam
10 to 15 inches—Very gravelly sandy clay loam
15 inches—Igneous bedrock

Rock outcrop

Rock outcrop consists of exposures of bare bedrock.

Interpretive Groups

Land capability classification: Checkett—7S nonirrigated; Rock outcrop—8 nonirrigated
Range site: Checkett—Semidesert Shallow Loam (Utah Juniper-Bluebunch Wheatgrass); Rock outcrop—no range site is assigned

349—Chuska-Checkett gravelly loams, 8 to 25 percent slopes

Setting

Landform: Dissected fan remnants and foothills
Slope: 8 to 25 percent
Elevation: 5,600 to 6,200 feet
Mean annual temperature: 45 to 50 degrees
Mean annual precipitation: 10 to 12 inches
Frost-free period: 120 to 140 days

Composition

Major components

Chuska and similar soils: 45 percent
Checkett and similar soils: 40 percent

Minor components

Bamos soils: 5 percent
Radec soils: 5 percent
Rock outcrop: 5 percent

Major Components Description

Chuska

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Alluvium derived from igneous rock
Available water capacity: About 3 inches
Typical profile:
0 to 4 inches—Gravelly loam
4 to 14 inches—Clay loam
14 to 19 inches—Very gravelly clay loam
19 inches—Indurated duripan

Checkett

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Colluvium and residuum derived from igneous rock
Available water capacity: About 2 inches

Available water capacity: About 11 inches
Typical profile:
0 to 2 inches—Loam
2 to 60 inches—Clay loam

Interpretive Groups

Land capability classification: 6E nonirrigated
Range site: Detra—Mountain Loam (Oak); Detra—Mountain Loam (Mountain Big Sagebrush)

369—Detra fine sandy loam, 15 to 40 percent slopes

Setting

Landform: Mountain slopes
Slope: 15 to 40 percent
Elevation: 6,000 to 8,200 feet
Mean annual temperature: 39 to 44 degrees
Mean annual precipitation: 16 to 22 inches
Frost-free period: 60 to 100 days

Composition

Major components

Detra and similar soils: 85 percent

Minor components

Kolob soils: 5 percent
Sheckle soils: 5 percent
Trag soils: 5 percent

Major Component Description

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium derived from sedimentary rock
Available water capacity: About 10 inches
Typical profile:
0 to 11 inches—Fine sandy loam
11 to 27 inches—Sandy clay loam
27 to 41 inches—Clay loam
41 to 50 inches—Sandy clay loam
50 to 55 inches—Clay loam
55 to 60 inches—Sandy clay loam

Interpretive Groups

Land capability classification: 6E nonirrigated
Range site: Mountain Loam (Oak)

370—Dixie gravelly loam, 2 to 8 percent slopes

Setting

Landform: Fan remnants
Slope: 2 to 8 percent
Elevation: 5,100 to 5,600 feet
Mean annual temperature: 45 to 50 degrees
Mean annual precipitation: 10 to 12 inches
Frost-free period: 100 to 140 days

Composition

Major components

Dixie and similar soils: 85 percent

Minor components

Sevy soils: 3 percent
Soils that have more than 35 percent rock fragments throughout: 3 percent
Annabella soils: 2 percent
Crestline soils: 2 percent
Decca soils: 2 percent
Escalante soils: 2 percent
Garbo soils: 1 percent

Major Component Description

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium derived from sedimentary and igneous rocks
Available water capacity: About 5 inches
Typical profile:
0 to 6 inches—Gravelly loam
6 to 10 inches—Gravelly clay loam
10 to 15 inches—Very gravelly clay loam
15 to 27 inches—Very gravelly loam
27 to 60 inches—Very gravelly sandy loam

Interpretive Groups

Land capability classification: 3E irrigated, 7E nonirrigated
Range site: Semidesert Gravelly Loam (Wyoming Big Sagebrush) South

371—Dixie-Checkett complex, 5 to 40 percent slopes

Setting

Landform: Hill slopes and foothills

percent; content of rock fragments—35 to 50 percent

A horizon:
Texture—very cobbly loam or very cobbly sandy loam

AC or C horizon:
Value—6 or 7 dry, 4 or 5 moist
Chroma—3 or 4
Texture—very cobbly sandy loam, cobbly sandy loam, or very gravelly sandy loam
Content of rock fragments—30 to 50 percent

Checkett Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderately slow
Landscape position: Fan remnants, foothills, hill slopes and mountain slopes
Parent material: Kind—residuum and colluvium; source—igneous rocks
Slope: 2 to 40 percent
Elevation: 5,200 to 6,500 feet
Average annual precipitation: 8 to 12 inches
Average annual air temperature: 45 to 50 degrees F
Frost-free period: 90 to 140 days

Taxonomic class: Loamy-skeletal, mixed, mesic Lithic Xeric Haplargids

Typical Pedon

Checkett gravelly loam, 5 to 40 percent slopes, about 2.1 miles north of the REDCO silver mine in Escalante Valley, about 700 feet south and 750 feet east of the northwest corner of sec. 35, T. 35 S., R. 17 W.

About 50 percent of the surface is covered with gravel.

A—0 to 3 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak medium platy structure parting to weak thin platy; slightly hard, very friable, slightly sticky and slightly plastic; common medium roots and many fine and very fine roots; few medium vesicular pores and common fine and very fine vesicular pores; 20 percent gravel; slightly alkaline (pH 7.6); clear wavy boundary.

BA—3 to 6 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; few medium interstitial pores and many fine and very fine interstitial pores; 25 percent gravel; slightly alkaline (pH 7.8); clear wavy boundary.

Bt—6 to 14 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few coarse and medium roots and many fine and very fine roots; many fine and very fine interstitial pores; common distinct clay films on faces of peds; 10 percent cobble and 40 percent gravel; slightly alkaline (pH 7.8); gradual wavy boundary.

Btk—14 to 19 inches; strong brown (7.5YR 5/6) very cobbly clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common fine and very fine roots; many fine and very fine interstitial pores; common distinct clay films on faces of peds; 35 percent cobble and 15 percent gravel; strongly effervescent, carbonates are disseminated and occur as coatings on rock fragments; moderately alkaline (pH 8.0); clear wavy boundary.

R—19 inches; fractured igneous bedrock.

Range in Characteristics

Depth to bedrock: 14 to 20 inches

A horizon:
Hue—7.5YR or 10YR

BA horizon:
Texture—very gravelly loam or gravelly clay loam
Content of clay—20 to 30 percent
Content of rock fragments—25 to 40 percent

Bt horizon:
Texture—very gravelly clay loam or very cobbly clay loam
Content of clay—30 to 35 percent
Content of rock fragments—35 to 50 percent
Reaction—slightly alkaline or moderately alkaline

Btk horizon:
Value—5 or 6 dry, 4 or 5 moist
Chroma—4 to 6
Texture—very gravelly sandy clay loam or very cobbly clay loam
Content of clay—20 to 35 percent
Reaction—moderately alkaline or strongly alkaline

Chuska Series

Depth class: Shallow
Drainage class: Well drained

Detra Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape position: Mountain slopes, mountain valleys, and mountaintops
Parent material: Kind—alluvium, colluvium, and residuum; source—sedimentary rocks
Slope: 2 to 40 percent
Elevation: 6,000 to 8,500 feet
Average annual precipitation: 16 to 22 inches
Average annual air temperature: 39 to 44 degrees F
Frost-free period: 60 to 100 days

Taxonomic class: Fine-loamy, mixed Pachic Argiborolls

Typical Pedon

Detra complex, 2 to 15 percent slopes, about 2,200 feet east of Kolob Reservoir, 880 feet south and 760 feet west of the northeast corner of sec. 29, T. 39 S., R. 9 W.

A—0 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate very fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; few fine roots and common very fine roots; few fine and medium pores and common very fine pores; neutral (pH 7.2); clear smooth boundary.

BA—11 to 18 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few medium pores and common fine and very fine pores; slightly alkaline (pH 7.4); clear wavy boundary.

Bt1—18 to 27 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; very hard, firm, sticky and plastic; few fine and very fine roots; few fine and medium pores and many very fine pores; common faint clay films on faces of peds; slightly alkaline (pH 7.4); gradual smooth boundary.

Bt2—27 to 41 inches; strong brown (7.5YR 5/6) clay loam, strong brown (7.5YR 4/6) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; few medium, fine, and very fine roots; few fine pores and common very fine pores; common distinct continuous clay films on faces of peds; slightly alkaline (pH 7.6); gradual smooth boundary.

Bt3—41 to 50 inches; brown (7.5YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; few medium pores, common fine pores, and many very fine pores; common distinct clay films on faces of peds; slightly alkaline (pH 7.6); clear wavy boundary.

Bt4—50 to 55 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; extremely hard, firm, sticky and plastic; few fine and very fine roots; few medium pores and common fine and very fine pores; common distinct clay films on faces of peds; slightly alkaline (pH 7.8); clear wavy boundary.

BC—55 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few medium pores and common fine and very fine pores; slightly alkaline (pH 7.6).

Range in Characteristics

Thickness of the mollic epipedon: 19 to 36 inches
Particle-size control section: Content of clay—25 to 35 percent

A horizon:
Hue—7.5YR or 10YR
Chroma—1 or 2
Texture—fine sandy loam or loam
Reaction—neutral or slightly alkaline

Bt horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 to 6 dry, 2 to 5 moist
Chroma—2 to 6
Texture—sandy clay loam or clay loam
Reaction—neutral or slightly alkaline

BC horizon:
Hue—7.5YR or 10YR
Value—5 dry, 4 moist
Chroma—3 or 4
Texture—fine sandy loam
Reaction—moderately alkaline

Dixie Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow

Landscape position: Fan remnants, hill slopes, and foothills
Parent material: Kind—alluvium and colluvium; source—igneous and sedimentary rocks
Slope: 2 to 25 percent
Elevation: 5,100 to 6,000 feet
Average annual precipitation: 10 to 12 inches
Average annual air temperature: 45 to 50 degrees F
Frost-free period: 100 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Xeric Calciargids

Typical Pedon

Dixie gravelly loam, 2 to 8 percent slopes, about 3.4 miles west of Antelope Peak, about 2,030 feet north and 1,170 feet east of the southwest corner of sec. 13, T. 35 S., R. 15 W.

About 1 percent of the surface is covered with stones.

A—0 to 2 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; weak thin platy structure parting to weak very thin platy; soft, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine and many very fine vesicular pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bw—2 to 6 inches; light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate thick platy structure parting to weak medium and fine subangular blocky; hard, friable, sticky and plastic; few medium roots and common fine and very fine roots; common fine and very fine pores; 5 percent cobble and 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt—6 to 10 inches; brown (7.5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few medium roots and common fine and very fine roots; common fine and very fine pores; 10 percent cobble and 15 percent gravel; few faint clay films on faces of peds; neutral (pH 7.0); clear smooth boundary.

Bk1—10 to 15 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; hard, firm, sticky and plastic; few medium roots and common fine and very fine roots; few medium pores and common fine and very fine pores; 10 percent cobble and 30 percent gravel; strongly effervescent, carbonates are disseminated and in few flecks; moderately alkaline (pH 8.4); clear wavy boundary.

Bk2—15 to 27 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; massive; discontinuously weakly cemented, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine pores; 5 percent cobble and 45 percent gravel; strongly effervescent, carbonates are disseminated and occur as thin coatings on rock fragments; strongly alkaline (pH 9.0); clear wavy boundary.

Bk3—27 to 43 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine and very fine interstitial pores; 55 percent gravel; strongly effervescent, carbonates are disseminated and occur as thin coatings on rock fragments; strongly alkaline (pH 8.8); clear wavy boundary.

Bk4—43 to 60 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; single grain; loose, nonsticky and nonplastic; common fine and very fine roots; many fine and very fine interstitial pores; 5 percent cobble and 40 percent gravel; strongly effervescent, carbonates are disseminated and occur as thin coatings on rock fragments; strongly alkaline (pH 8.6).

Range in Characteristics

Depth to secondary carbonates: 10 to 20 inches

A horizon:
Hue—7.5YR or 10YR
Value—5 or 6 dry, 3 or 4 moist
Chroma—2 to 4
Reaction—neutral or slightly alkaline

Bw horizon:
Hue—7.5YR or 10YR
Value—3 to 5 moist
Texture—loam or clay loam
Content of gravel and cobble—0 to 20 percent
Reaction—neutral or slightly alkaline

Bt horizon:
Hue—5YR or 7.5YR
Value—4 to 6 dry, 3 or 4 moist
Chroma—3 to 6
Texture—gravelly clay loam or gravelly sandy clay loam with strata of gravelly loam
Content of gravel and cobble—15 to 35 percent
Reaction—neutral to moderately alkaline

Bk horizon:
Hue—7.5YR or 10YR
Value—5 to 8 dry, 4 to 7 moist
Chroma—2 to 4
Texture—very gravelly sandy loam, very gravelly clay loam, or very gravelly loam

Content of rock fragments—15 to 60 percent
Reaction—moderately alkaline or strongly alkaline

Doyce Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape position: Fan remnants
Parent material: Kind—alluvium; source—igneous and sedimentary rocks
Slope: 2 to 15 percent
Elevation: 5,700 to 7,000 feet
Average annual precipitation: 12 to 14 inches
Average annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 110 days

Taxonomic class: Fine-loamy, mixed, mesic Calcic Argixerolls

Typical Pedon

Doyce loam, 2 to 15 percent slopes, about 3.2 miles north-northwest of the junction of State Highway 20 and Interstate 15, about 440 feet south and 2,060 feet east of the northwest corner of sec. 13, T. 31 S., R. 9 W.

A—0 to 2 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; weak thick and moderately thick platy structure parting to moderate fine and very fine granular; soft, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine vesicular and interstitial pores and many very fine vesicular and interstitial pores; 10 percent gravel; moderately alkaline (pH 8.0); clear smooth boundary.

Bw—2 to 5 inches; brown (10YR 4/3) clay loam, dark brown (7.5YR 3/2) moist; moderate thin and very thin platy structure parting to moderate fine granular; slightly hard, firm, sticky and plastic; few medium and fine roots and common very fine roots; few medium and fine tubular pores and many very fine interstitial pores; moderately alkaline (pH 8.0); clear smooth boundary.

Bt—5 to 10 inches; brown (10YR 4/3) clay loam, dark brown (7.5YR 3/2) moist; moderate fine prismatic structure parting to strong very fine subangular blocky; hard, firm, sticky and plastic; few medium, fine, and very fine roots; few fine tubular pores, common very fine tubular pores, and many very fine interstitial pores; many distinct clay films on faces of peds; moderately alkaline (pH 8.2); clear smooth boundary.

Btk—10 to 19 inches; pale brown (10YR 6/3) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure parting to weak fine subangular blocky; hard, firm, sticky and plastic; few fine and very fine roots; few very fine tubular pores and common very fine interstitial pores; few faint clay films on faces of peds; strongly effervescent, carbonates are disseminated and occur as common fine flecks and in veins; moderately alkaline (pH 8.4); clear wavy boundary.

Bk1—19 to 28 inches; pale brown (10YR 6/3) loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular and interstitial pores; strongly effervescent, carbonates are disseminated; moderately alkaline (pH 8.4); clear irregular boundary.

Bk2—28 to 40 inches; very pale brown (10YR 7/3) loam, light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine tubular pores; violently effervescent, carbonates are disseminated and occur in discontinuous moderately cemented carbonate lenses; strongly alkaline (pH 8.6); clear wavy boundary.

Bk3—40 to 60 inches; pink (7.5YR 7/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine tubular pores; strongly effervescent, carbonates are disseminated and occur in many discontinuous moderately cemented carbonate lenses; strongly alkaline (pH 8.6).

Range in Characteristics

Depth to calcic horizon: 10 to 22 inches
Thickness of the mollic epipedon: 10 to 12 inches
Particle-size control section: Content of clay—27 to 35 percent; content of rock fragments—0 to 5 percent

A horizon:
Texture—loam or fine sandy loam
Reaction—neutral to moderately alkaline

Bt horizon:
Value—4 to 6 dry
Chroma—2 to 4
Texture—clay loam or sandy clay loam
Content of gravel—0 to 5 percent
Reaction—slightly alkaline or moderately alkaline

Bk horizon:
Hue—7.5YR or 10YR
Value—6 or 7 dry, 4 to 6 moist
Chroma—3 or 4
Texture—loam, sandy loam, or silt loam
Content of gravel and cobble—0 to 20 percent
Reaction—moderately alkaline or strongly alkaline

Table 8.—Rangeland Productivity and Characteristic Plant Communities—Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
345:					
Cathedral	Mountain Shallow Loam (Low Sagebrush)	Favorable	1,200	Other perennial grasses	20
		Normal	900	Other perennial forbs	10
		Unfavorable	600	Slender wheatgrass	10
				Muttongrass	10
				Bluebunch wheatgrass	10
				Nevada bluegrass	10
				Antelope bitterbrush	10
				Mountain big sagebrush	5
				Curlleaf mountainmahogany	5
				Mountain snowberry	5
				Other shrubs	5
Posant	Mountain Shallow Loam (Curlleaf Mountainmahogany)	Favorable	2,500	Curlleaf mountainmahogany	40
		Normal	1,800	Bluebunch wheatgrass	20
		Unfavorable	1,300	Mountain big sagebrush	10
				Indian ricegrass	5
				Muttongrass	5
				Other shrubs	5
				Other perennial forbs	5
				Other perennial grasses	5
				Antelope bitterbrush	5
346:					
Checkett	Semidesert Shallow Loam (Black Sagebrush)	Favorable	700	Bluebunch wheatgrass	20
		Normal	600	Black sagebrush	20
		Unfavorable	400	Horsebrush	10
				Indian ricegrass	10
				Douglas rabbitbrush	5
				Shadscale	5
				Hairy balsamroot	5
				Nevada bluegrass	5
				Hood phlox	5
				Sandberg bluegrass	5
				Other perennial forbs	5
				Bottlebrush squirreltail	5
347:					
Checkett	Semidesert Shallow Loam (Wyoming Big Sagebrush)	Favorable	900	Bluebunch wheatgrass	20
		Normal	650	Wyoming big sagebrush	20
		Unfavorable	300	Other shrubs	15
				Other perennial grasses	13
				Indian ricegrass	10
				Other perennial forbs	10
				Nevada bluegrass	7
				Nevada Mormon tea	5
348:					
Checkett	Semidesert Shallow Loam (Utah Juniper-Bluebunch Wheatgrass)	Favorable	350	Black sagebrush	30
		Normal	250	Bluebunch wheatgrass	25
		Unfavorable	175	Other perennial forbs	15
				Indian ricegrass	10
				Phlox	5
				Other shrubs	5
				Nevada bluegrass	5
				Shadscale	5
				Other perennial grasses	5
				Globemallow	5

Table 8.—Rangeland Productivity and Characteristic Plant Communities—Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
367:					
Dennot	Upland Stony Loam (Pinyon-Utah Juniper)	Favorable	900		15
		Normal	500	Other shrubs	15
		Unfavorable	200	Indian ricegrass	15
				Other perennial grasses	10
				Bluegrass	10
				Antelope bitterbrush	10
				Other perennial forbs	10
				Bottlebrush squirreltail	5
				Blue grama	5
				Needleandthread	5
368:					
Detra	Mountain Loam (Oak)	Favorable	2,300	Gambel oak	30
		Normal	1,650	Other shrubs	15
		Unfavorable	1,450	Utah snowberry	10
				Other perennial forbs	10
				Bigtooth maple	5
				Kentucky bluegrass	5
				Bearded wheatgrass	5
				Slender wheatgrass	5
				Other perennial grasses	5
				Mountain big sagebrush	5
				Mountain brome	5
Detra	Mountain Loam (Mountain Big Sagebrush)	Favorable	1,600	Other perennial forbs	20
		Normal	1,025	Bluebunch wheatgrass	15
		Unfavorable	825	Western wheatgrass	15
				Nevada bluegrass	15
				Other perennial grasses	15
				Letterman needlegrass	10
				Other shrubs	5
				Mountain big sagebrush	5
369:					
Detra	Mountain Loam (Oak)	Favorable	2,300	Gambel oak	30
		Normal	1,650	Other shrubs	15
		Unfavorable	1,450	Utah snowberry	10
				Other perennial forbs	10
				Bigtooth maple	5
				Kentucky bluegrass	5
				Bearded wheatgrass	5
				Slender wheatgrass	5
				Other perennial grasses	5
				Mountain big sagebrush	5
				Mountain brome	5
370:					
Dixie	Semidesert Gravelly Loam (Wyoming Big Sagebrush) South	Favorable	800	Basin big sagebrush	25
		Normal	600	Indian ricegrass	20
		Unfavorable	400	Galleta	15
				Other perennial forbs	10
				Winterfat	5
				Other shrubs	5
				Fourwing saltbush	5
				Nevada Mormon tea	5
				Bluebunch wheatgrass	5
				Other perennial grasses	5

Table 16.—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
347:												
Checkett--------	0-3	Gravelly loam	GM-GC, GC	A-4, A-6	0	0	60-65	50-60	45-55	35-40	25-35	5-15
	3-6	Gravelly clay loam	GC	A-6	0	0	65-70	60-65	55-60	40-50	30-40	10-15
	6-14	Very gravelly clay loam	GC	A-2	0	5-10	45-50	40-45	35-40	30-35	30-40	10-15
	14-19	Very cobbly clay loam	CL	A-6	0	40-50	80-85	75-80	65-75	50-60	30-40	10-15
	19-29	Unweathered bedrock			0	0	0	0	0	0	---	NP
Rock outcrop.												
348:												
Checkett--------	0-4	Gravelly loam	CL-ML, CL	A-4, A-6	0	0	75-80	70-75	60-70	50-55	25-35	5-15
	4-7	Very gravelly loam	GM-GC, GC	A-2, A-4, A-6	0	0-5	50-55	45-50	40-45	30-40	25-35	5-15
	7-10	Very gravelly clay loam	GC	A-6	0	5-10	50-55	45-50	40-45	35-40	30-40	10-15
	10-15	Very gravelly sandy clay loam	GC	A-2	0	10-15	55-60	50-55	40-50	25-30	30-40	10-15
	15-25	Unweathered bedrock			0	0	0	0	0	0	---	NP
Rock outcrop.												
349:												
Chuska----------	0-4	Gravelly loam	GM-GC, SC-SM	A-4	0	0	65-75	60-70	50-65	35-50	20-30	5-10
	4-14	Clay loam	CL	A-6	0	0	95-100	90-95	80-90	65-70	30-40	10-15
	14-19	Very gravelly clay loam	GM-GC, GC	A-2	0	0	45-55	35-45	25-35	20-30	25-35	5-15
	19-29	Indurated			0	0	0	0	0	0	---	NP
Checkett--------	0-4	Gravelly loam	CL-ML, CL	A-4, A-6	0	0	75-80	70-75	60-70	50-55	25-35	5-15
	4-7	Very gravelly loam	GM-GC, GC	A-2, A-4, A-6	0	0-5	50-55	45-50	40-45	30-40	25-35	5-15
	7-10	Very gravelly clay loam	GC	A-6	0	5-10	50-55	45-50	40-45	35-40	30-40	10-15
	10-15	Very gravelly sandy clay loam	GC	A-2	0	10-15	55-60	50-55	40-50	25-30	30-40	10-15
	15-25	Unweathered bedrock			0	0	0	0	0	0	---	NP
350:												
Cinder land.												

Table 16.—Engineering Index Properties—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
367:												
Dennot	0-8	Very gravelly loam	GM-GC, GC	A-2	0	0	40-50	35-45	30-40	25-30	20-35	5-15
	8-16	Gravelly loam	GM-GC, GC	A-4, A-6	0	0	55-65	50-60	45-55	35-45	20-35	5-15
	16-23	Very gravelly loam	GM-GC, GC	A-2	0	0	45-55	40-50	35-45	25-35	20-35	5-15
	23-47	Extremely gravelly sandy loam	GP-GC	A-1, A-2	0	0-10	20-30	15-25	10-15	5-10	20-30	5-10
	47-60	Extremely gravelly sandy loam	GP-GC	A-1, A-2	0	0-10	15-25	10-20	10-15	5-10	20-30	NP-10
368:												
Detra	0-11	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-30	NP-10
	11-27	Sandy clay loam	CL, SC	A-6	0	0	100	100	80-95	40-65	30-40	10-20
	27-41	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	41-50	Sandy clay loam	CL, SC	A-6	0	0	100	100	80-95	40-65	30-40	10-20
	50-55	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	55-60	Sandy clay loam	CL	A-6	0	0	100	100	80-95	50-65	30-40	10-20
Detra	0-2	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	85-95	60-75	25-35	5-15
	2-8	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	8-24	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	24-36	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	36-60	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
369:												
Detra	0-11	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-30	NP-10
	11-27	Sandy clay loam	CL, SC	A-6	0	0	100	100	80-95	40-65	30-40	10-20
	27-41	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	41-50	Sandy clay loam	CL, SC	A-6	0	0	100	100	80-95	40-65	30-40	10-20
	50-55	Clay loam	CL, SC	A-6	0	0	100	100	80-100	40-75	30-40	10-20
	55-60	Sandy clay loam	CL	A-6	0	0	100	100	80-95	50-65	30-40	10-20
370:												
Dixie	0-6	Gravelly loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0-5	0-5	75-90	70-85	60-80	40-60	25-35	5-15
	6-10	Gravelly clay loam	CL	A-6	0	5-15	70-80	65-75	60-75	50-60	30-40	10-15
	10-15	Very gravelly clay loam	GC	A-6	0	5-15	50-65	45-60	40-60	35-50	30-40	10-15
	15-27	Very gravelly loam	GM, GM-GC	A-2	0	0-5	40-50	35-45	30-45	25-35	20-30	NP-10
	27-60	Very gravelly sandy loam	GM	A-1	0	0-5	35-55	30-50	15-35	10-20	15-25	NP-5

Table 17.—Physical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
347:												
Rock outcrop.												
Checkett	0-3	18-27	1.20-1.30	0.60-2.00	0.11-0.13	Low	1.0-2.0	0.17	0.37	1	7	38
	3-6	27-35	1.25-1.35	0.20-0.60	0.13-0.15	Moderate	1.0-2.0	0.20	0.37			
	6-14	27-35	1.25-1.35	0.20-0.60	0.09-0.11	Low	1.0-2.0	0.15	0.37			
	14-19	27-35	1.30-1.40	0.20-0.60	0.09-0.11	Low	0.5-1.0	0.10	0.32			
	19-29	---	---	0.01-20.00	---		---	---	---			
348:												
Rock outcrop.												
Checkett	0-4	18-27	1.20-1.30	0.60-2.00	0.13-0.15	Moderate	1.0-2.0	0.24	0.37	1	7	38
	4-7	18-27	1.25-1.35	0.60-2.00	0.10-0.12	Low	1.0-2.0	0.17	0.43			
	7-10	27-35	1.30-1.40	0.20-0.60	0.11-0.13	Low	1.0-2.0	0.15	0.43			
	10-15	25-35	1.40-1.50	0.60-2.00	0.10-0.12	Low	0.5-1.0	0.10	0.28			
	15-25	---	---	0.00-0.01	---		---	---	---			
349:												
Chuska	0-4	18-27	1.25-1.40	0.60-2.00	0.12-0.14	Moderate	1.0-2.0	0.20	0.37	1	7	38
	4-14	27-35	1.30-1.45	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.32	0.32			
	14-19	27-35	1.40-1.55	0.20-0.60	0.09-0.11	Moderate	0.5-1.0	0.10	0.32			
	19-29	---	---	0.00-0.06	---		---	---	---			
Checkett	0-4	18-27	1.20-1.30	0.60-2.00	0.13-0.15	Moderate	1.0-2.0	0.24	0.37	1	7	38
	4-7	18-27	1.25-1.35	0.60-2.00	0.10-0.12	Low	1.0-2.0	0.17	0.43			
	7-10	27-35	1.30-1.40	0.20-0.60	0.11-0.13	Low	1.0-2.0	0.15	0.43			
	10-15	25-35	1.40-1.50	0.60-2.00	0.10-0.12	Low	0.5-1.0	0.10	0.28			
	15-25	---	---	0.00-0.01	---		---	---	---			
350:												
Cinder land.												
351:												
Cranbay	0-5	18-27	1.30-1.40	0.60-2.00	0.13-0.14	Moderate	5.0-6.0	0.10	0.32	4	7	38
	5-11	27-35	1.30-1.40	0.20-0.60	0.13-0.14	Moderate	2.0-3.0	0.10	0.24			
	11-16	27-35	1.30-1.40	0.20-0.60	0.13-0.14	Moderate	2.0-3.0	0.10	0.24			
	16-32	20-30	1.40-1.50	0.60-2.00	0.13-0.14	Moderate	2.0-3.0	0.10	0.24			
	32-33	18-27	1.40-1.50	0.60-2.00	0.13-0.14	Moderate	1.0-2.0	0.10	0.24			
	33-60	27-35	1.40-1.50	0.20-0.60	0.08-0.10	Moderate	1.0-2.0	0.05	0.24			
Winnemucca	0-11	27-35	1.25-1.40	0.20-0.60	0.09-0.10	Moderate	5.0-6.0	0.10	0.28	5	8	---
	11-22	27-35	1.30-1.45	0.20-0.60	0.11-0.13	Moderate	2.0-5.0	0.05	0.28			
	22-37	35-40	1.30-1.45	0.06-0.20	0.11-0.13	Moderate	1.0-3.0	0.05	0.28			
	37-60	27-35	1.30-1.45	0.20-0.60	0.11-0.13	Moderate	0.5-2.0	0.05	0.28			
352:												
Crestline	0-5	5-15	1.40-1.55	2.00-6.00	0.07-0.09	Low	1.0-2.0	0.20	0.24	4	5	56
	5-12	5-18	1.40-1.55	2.00-6.00	0.10-0.11	Low	1.0-2.0	0.20	0.20			
	12-19	5-18	1.40-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.10	0.20			
	19-46	5-18	1.40-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.10	0.20			
	46-60	0-5	1.50-1.65	>20.00	0.04-0.05	Low	0.0-0.5	0.05	0.15			
353:												
Crestline	0-6	5-15	1.35-1.50	2.00-6.00	0.10-0.11	Low	1.0-2.0	0.37	0.37	5	3	86
	6-12	5-18	1.40-1.55	2.00-6.00	0.10-0.11	Low	1.0-2.0	0.24	0.24			
	12-36	5-18	1.40-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.10	0.20			
	36-60	5-18	1.40-1.55	2.00-6.00	0.08-0.09	Low	0.5-1.0	0.10	0.20			

Table 17.—Physical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
368:												
Detra	0-11	10-20	1.35-1.50	2.00-6.00	0.11-0.13	Low	4.0-5.0	0.24	0.24	5	3	86
	11-27	25-35	1.25-1.40	0.20-0.60	0.17-0.19	Moderate	2.0-4.0	0.24	0.24			
	27-41	27-35	1.25-1.40	0.20-0.60	0.17-0.19	Moderate	1.0-3.0	0.24	0.24			
	41-50	25-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	1.0-2.0	0.24	0.24			
	50-55	27-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
	55-60	25-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
Detra	0-2	18-27	1.25-1.40	0.60-2.00	0.16-0.18	Moderate	4.0-5.0	0.28	0.28	5	6	48
	2-8	27-35	1.25-1.40	0.20-0.60	0.17-0.19	Moderate	2.0-4.0	0.24	0.24			
	8-24	27-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	1.0-3.0	0.24	0.24			
	24-36	35-40	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
	36-60	35-40	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
369:												
Detra	0-11	10-20	1.35-1.50	2.00-6.00	0.11-0.13	Low	4.0-5.0	0.24	0.24	5	3	86
	11-27	25-35	1.25-1.40	0.20-0.60	0.17-0.19	Moderate	2.0-4.0	0.24	0.24			
	27-41	27-35	1.25-1.40	0.20-0.60	0.17-0.19	Moderate	1.0-3.0	0.24	0.24			
	41-50	25-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	1.0-2.0	0.24	0.24			
	50-55	27-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
	55-60	25-35	1.35-1.50	0.20-0.60	0.17-0.19	Moderate	0.5-2.0	0.24	0.24			
370:												
Dixie	0-6	18-27	1.25-1.40	0.60-2.00	0.13-0.14	Low	1.0-2.0	0.32	0.37	5	7	38
	6-10	27-35	1.30-1.45	0.20-0.60	0.13-0.15	Moderate	1.0-2.0	0.17	0.32			
	10-15	27-35	1.30-1.45	0.20-0.60	0.11-0.13	Moderate	0.5-1.0	0.10	0.32			
	15-27	18-27	1.30-1.45	0.60-2.00	0.08-0.10	Low	0.5-1.0	0.10	0.32			
	27-60	5-20	1.40-1.55	2.00-6.00	0.05-0.07	Low	0.5-1.0	0.05	0.17			
371:												
Dixie	0-4	18-27	1.25-1.40	0.60-2.00	0.08-0.11	Low	1.0-2.0	0.10	0.37	5	8	---
	4-7	27-35	1.30-1.45	0.20-0.60	0.16-0.17	Moderate	1.0-2.0	0.32	0.32			
	7-16	27-35	1.30-1.45	0.20-0.60	0.14-0.16	Moderate	0.5-1.0	0.17	0.32			
	16-22	18-27	1.30-1.45	0.60-2.00	0.12-0.14	Moderate	0.5-1.0	0.17	0.32			
	22-44	27-35	1.30-1.45	0.20-0.60	0.12-0.13	Moderate	0.5-1.0	0.10	0.32			
	44-60	18-27	1.30-1.45	0.60-2.00	0.13-0.14	Moderate	0.5-1.0	0.17	0.32			
Checkett	0-3	18-27	1.20-1.30	0.60-2.00	0.11-0.13	Low	1.0-2.0	0.17	0.37	1	7	38
	3-6	27-35	1.25-1.35	0.20-0.60	0.13-0.15	Moderate	1.0-2.0	0.20	0.37			
	6-14	27-35	1.25-1.35	0.20-0.60	0.09-0.11	Low	1.0-2.0	0.15	0.37			
	14-19	27-35	1.30-1.40	0.20-0.60	0.09-0.11	Low	0.5-1.0	0.10	0.32			
	19-29	---	---	0.01-20.00	---		---	---	---			
372:												
Doyce	0-2	18-27	1.25-1.40	0.60-2.00	0.14-0.16	Moderate	2.0-3.0	0.37	0.37	5	6	48
	2-5	27-35	1.30-1.45	0.20-0.60	0.17-0.19	Moderate	2.0-3.0	0.32	0.32			
	5-10	27-35	1.30-1.45	0.20-0.60	0.17-0.19	Moderate	1.0-2.0	0.32	0.32			
	10-19	27-35	1.30-1.45	0.20-0.60	0.17-0.19	Moderate	1.0-2.0	0.32	0.32			
	19-40	18-27	1.30-1.45	0.60-2.00	0.16-0.18	Low	0.5-1.0	0.43	0.43			
	40-60	10-20	1.50-1.65	2.00-6.00	0.10-0.12	Low	0.5-1.0	0.28	0.28			
373:												
Dune land.												
374:												
Elenore	0-4	18-27	1.25-1.35	0.60-2.00	0.12-0.14	Low	2.0-3.0	0.20	0.37	1	7	38
	4-7	18-27	1.30-1.40	0.60-2.00	0.14-0.16	Low	2.0-3.0	0.32	0.32			
	7-14	27-35	1.35-1.45	0.20-0.60	0.16-0.18	Moderate	1.0-2.0	0.28	0.28			
	14-18	18-27	1.40-1.50	0.60-2.00	0.13-0.15	Low	1.0-2.0	0.24	0.24			
	18-27	---	---	0.00-0.06	---		---	---	---			
	27-60	0-5	1.60-1.70	6.00-20.00	0.04-0.05	Low	0.5-1.0	0.05	0.15			

Table 18.—Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	Pct	meq/100g	pH	Pct	Pct	mmhos/cm	
347:								
Rock outcrop.								
Checkett--------	0-3	18-27	15.0-25.0	7.4-7.8	---	---	0-2	---
	3-6	27-35	20.0-30.0	7.9-8.4	---	---	0-4	---
	6-14	27-35	20.0-30.0	7.4-8.4	---	---	0-4	---
	14-19	27-35	15.0-30.0	7.9-9.0	5-15	---	0-4	---
	19-29	---	---	---	---	---	---	---
348:								
Rock outcrop.								
Checkett--------	0-4	18-27	15.0-25.0	7.4-7.8	---	---	---	---
	4-7	18-27	15.0-25.0	7.4-7.8	---	---	0-2	---
	7-10	27-35	20.0-30.0	7.9-8.4	---	---	0-2	---
	10-15	25-35	15.0-30.0	7.9-8.4	5-10	---	0-2	---
	15-25	---	---	---	---	---	---	---
349:								
Chuska----------	0-4	18-27	10.0-20.0	7.9-8.4	0-5	---	0-2	---
	4-14	27-35	20.0-35.0	7.9-8.4	0-10	---	---	---
	14-19	27-35	20.0-30.0	7.9-8.4	15-25	---	---	---
	19-29	---	---	---	---	---	---	---
Checkett--------	0-4	18-27	15.0-25.0	7.4-7.8	---	---	---	---
	4-7	18-27	15.0-25.0	7.4-7.8	---	---	0-2	---
	7-10	27-35	20.0-30.0	7.9-8.4	---	---	0-2	---
	10-15	25-35	15.0-30.0	7.9-8.4	5-10	---	0-2	---
	15-25	---	---	---	---	---	---	---
350:								
Cinder land.								
351:								
Cranbay---------	0-5	18-27	15.0-25.0	6.6-7.3	---	---	---	---
	5-11	27-35	15.0-30.0	6.6-7.8	0-5	---	---	---
	11-16	27-35	15.0-30.0	6.6-7.8	5-20	---	---	---
	16-32	20-30	10.0-25.0	7.9-8.4	15-25	---	---	---
	32-33	18-27	10.0-25.0	7.9-8.4	15-25	---	---	---
	33-60	27-35	15.0-30.0	7.9-8.4	10-20	---	---	---
Winnemucca------	0-11	27-35	25.0-40.0	5.6-6.0	---	---	---	---
	11-22	27-35	20.0-35.0	6.1-6.5	---	---	---	---
	22-37	35-40	25.0-35.0	6.6-7.3	---	---	---	---
	37-60	27-35	15.0-30.0	6.6-7.3	---	---	---	---
352:								
Crestline-------	0-5	5-15	5.0-15.0	7.9-8.4	---	---	0-2	---
	5-12	5-18	5.0-20.0	7.4-8.4	---	---	0-2	---
	12-19	5-18	5.0-15.0	7.9-8.4	15-25	---	0-2	---
	19-46	5-18	5.0-15.0	7.9-9.0	10-20	---	0-2	---
	46-60	0-5	1.0-5.0	7.9-9.0	10-20	---	0-2	---
353:								
Crestline-------	0-6	5-15	5.0-15.0	7.4-8.4	---	---	0-2	---
	6-12	5-18	5.0-20.0	7.4-8.4	---	---	0-2	---
	12-36	5-18	5.0-15.0	7.9-8.4	15-25	---	0-2	---
	36-60	5-18	5.0-15.0	7.9-9.0	10-20	---	0-2	---

Table 18.—Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	Pct	meq/100g	pH	Pct	Pct	mmhos/cm	
368:								
Detra	0-11	10-20	15.0-25.0	6.6-7.3	---	---	---	---
	11-27	25-35	20.0-35.0	7.4-7.8	---	---	---	---
	27-41	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	41-50	25-35	20.0-35.0	7.4-7.8	---	---	---	---
	50-55	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	55-60	25-35	20.0-35.0	7.4-7.8	---	---	---	---
Detra	0-2	18-27	20.0-30.0	7.4-7.8	---	---	---	---
	2-8	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	8-24	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	24-36	35-40	25.0-40.0	6.6-7.8	---	---	---	---
	36-60	35-40	25.0-40.0	6.6-7.8	---	---	---	---
369:								
Detra	0-11	10-20	15.0-25.0	6.6-7.3	---	---	---	---
	11-27	25-35	20.0-35.0	7.4-7.8	---	---	---	---
	27-41	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	41-50	25-35	20.0-35.0	7.4-7.8	---	---	---	---
	50-55	27-35	20.0-35.0	7.4-7.8	---	---	---	---
	55-60	25-35	20.0-35.0	7.4-7.8	---	---	---	---
370:								
Dixie	0-6	18-27	15.0-25.0	6.6-7.3	---	---	---	---
	6-10	27-35	20.0-30.0	6.6-7.3	---	---	---	---
	10-15	27-35	15.0-30.0	7.9-8.4	10-15	---	0-2	---
	15-27	18-27	10.0-25.0	7.9-9.0	15-25	---	0-4	---
	27-60	5-20	5.0-20.0	7.9-9.0	15-20	---	0-4	---
371:								
Dixie	0-4	18-27	15.0-25.0	6.6-7.3	---	---	0-2	---
	4-7	27-35	20.0-30.0	7.4-7.8	---	---	0-2	---
	7-16	27-35	15.0-30.0	7.4-7.8	0-5	---	0-2	---
	16-22	18-27	10.0-20.0	7.9-9.0	5-15	---	0-2	---
	22-44	27-35	15.0-30.0	8.5-9.0	15-25	---	0-4	---
	44-60	18-27	10.0-20.0	8.5-9.0	10-15	---	0-4	---
Checkett	0-3	18-27	15.0-25.0	7.4-7.8	---	---	0-2	---
	3-6	27-35	20.0-30.0	7.9-8.4	---	---	0-4	---
	6-14	27-35	20.0-30.0	7.4-8.4	---	---	0-4	---
	14-19	27-35	15.0-30.0	7.9-9.0	5-15	---	0-4	---
	19-29	---	---	---	---	---	---	---
372:								
Doyce	0-2	18-27	15.0-30.0	6.6-8.4	---	---	---	---
	2-5	27-35	20.0-30.0	7.4-8.4	---	---	---	---
	5-10	27-35	20.0-30.0	7.4-8.4	0-5	---	---	---
	10-19	27-35	20.0-30.0	7.9-9.0	5-15	---	0-2	---
	19-40	18-27	10.0-25.0	7.9-9.0	15-30	---	0-2	---
	40-60	10-20	5.0-20.0	7.9-9.0	20-30	---	0-2	---
373:								
Dune land.								
374:								
Elenore	0-4	18-27	15.0-25.0	6.6-7.8	---	---	---	---
	4-7	18-27	15.0-25.0	7.4-7.8	0-5	---	---	---
	7-14	27-35	20.0-30.0	7.4-8.4	15-20	---	---	---
	14-18	18-27	10.0-20.0	7.9-8.4	20-25	---	0-2	---
	18-27	---	---	---	---	---	---	---
	27-60	0-5	0.0-5.0	7.9-8.4	5-15	---	0-2	---